Preferred Characteristics of Multipurpose Tree Species: A Case Study with Lowland and Upland Farmers in Leyte, Philippines

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Part of
a Regional Study on Farmers' Tree-Breeding Objectives
conducted by scientists in the
Multipurpose Tree Species Research Network

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In 1989, scientists in the Multipurpose Tree Species Research Network conducted a regional, interdisciplinary study on Farmers' Tree-Breeding Objectives. The study set out to identify farmers' preferences for individual tree characteristics from interviews in 28 villages in Bangladesh, India, Indonesia, Nepal, the Philippines, Sri Lanka, and Thailand. Once assembled, these preferences describe ideotypes, or "ideal trees," that provide a basis for genetic improvement of multipurpose tree species (MPTS) appropriate to farmers' perceived needs.

The study used a series of line drawings of tree "types" to help farmers compare and suggest preferred characteristics in discussions with the researchers. Discussions covered current uses of trees and ideas for improvement. Separate group discussions were held with men and women, and with other distinct ethnic or social groups in the village. The researchers summarized their initial findings and discussed them with the villagers in an attempt to obtain consensus on the ideotypes described.

Each participating researcher provided summaries of up to 6 composite ideotypes for the regional analysis. Report number 10 in the MPTS Research Series, *Defining Tree-Breeding Objectives for Multipurpose Tree Species in Asia*, by Lert Chunanaparb and Radha Ranganathan, provides a regional perspective on the resulting ideotypes. This case study from the Philippines was prepared in September 1990.

Map of villages included in the regional study.

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Summary

This study was conducted among lowland and upland households in Leyte, Philippines to: determine their preferred tree species for food, fuelwood, lumber, and fodder; identify desirable and undesirable characteristics of preferred tree species for various uses; and describe ideotypes of multipurpose tree species (MPTS) for various products.

As a source of food, lowland households preferred *Artocarpus heterophyllus* (jackfruit) which possesses the following characteristics: huge canopy, huge straight trunk that can be made into lumber, numerous branches, serrate leaves measuring 19.6 x 7.5 cm that can be used as fodder; and big primary and secondary roots. Upland households also preferred *Mangifera indica* (mango), which also has a huge canopy; tall, large, and straight trunk; many branches; elliptical leaves measuring 24 x 2.5 cm; and big primary and secondary roots.

For fuelwood, households in both villages preferred *Leucaena leucocephala.* Lowland farmers wanted a fuelwood tree with a large canopy, a few big stems, big branches, serrate leaves measuring 10 x 4 cm, and big secondary roots. Upland respondents also preferred a huge canopy but wanted numerous and small, straight stems and branches; elliptical leaves measuring 15 x 5 cm for fodder; and big primary and numerous secondary roots.

For lumber, lowland households preferred *Shorea guisok*, with its small canopy and branches positioned high up the tree; big, straight trunk; obovate leaf form (5 x 10 cm); and big primary and secondary roots. Upland farmers preferred *Vitex parviflora* with the same canopy type as *S. guisok*, has tall huge trunk with big branches high up the tree; elliptical leaf form measuring 15 x 4 cm.; and has big strong primary and secondary roots.

As a fodder tree, both lowland and upland respondents preferred *L. leucocephala.* They specified a huge canopy, many small straight stems, ovate leaves measuring 1 x 0.5 cm, and big primary and numerous secondary roots.

Households in both villages preferred to plant trees that provide food in their home gardens. Lowland farmers chose to plant fuelwood tree species in the home gardens; upland farmers planted them in field margins. Lumber trees were planted in field margins and fodder trees on the farm.

Planting materials for fruit trees were obtained from relatives, neighbors, existing trees, or by purchase. For fuelwood species, planting materials were taken from Visayas State College of Agriculture (ViSCA). Lumber trees were raised from wildlings.

Importance of the Study

Farming systems, particularly those of resource-poor farmers in marginal uplands, can be improved with the use of trees. With the increasing demand for fuelwood, lumber, and other essential tree products, the need for woody perennial has become more urgent than ever. Farmers' growing needs for these products from small units of land requires improved production of multipurpose tree species (MPTS). This research was undertaken to develop ideotypes of MPTS according to specifications of small farmers in Leyte, Philippines.

Study Objectives

1. To determine preferred tree species for food, fuelwood, lumber, and fodder of lowland and upland farmers;

2. To identify desirable and undesirable characteristics of preferred tree species for food, fuelwood, lumber and fodder; and

3. To describe ideotypes of MPTS for various products preferred by lowland and upland farmers

Methods

Selection of Respondents

Two villages, lowland and upland, were identified. For each, a complete list of households was obtained from *barangay* officials, and a random sample of 50 respondents was taken, representing the clusters in each barangay. Background information and socio-demographic data were collected using Interview Schedule No. 1. A second random selection of 25 respondents from the initial sample was taken and these respondents were interviewed twice regarding their forest and tree-use practices (Interview schedule No.2). These interviews took place in August and November 1989, to account for seasonal differences. Respondents who were not available for the second interview in November were not substituted.[2]

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[2]For more on the regional study of Farm and Village Forestry Land-Use Practices, see C.B. Mehl, *Farm- and Village-Forestry Practices: Methods for a Regional Study*, MPTS Research Series Handbook No. 1 (1990).

A third random selection of 10 respondents was made from the 25 respondents for a case study of homegardens in each *barangay*.[3] From the ten respondents, five were randomly drawn to participate in the tree-breeding study.

Data for this study were obtained in three phases. An interview schedule in the local dialect was used to gather initial data. The last phase of data were collected by convening first the wives, then the husbands, and finally husbands and wives together. Line drawings of the different tree characteristics (canopy shape, stem form, rooting habit, and leaf form and size -- see Figures 2-4) were shown to elicit their responses. Respondents were asked to choose commonly preferred characteristics for four tree types: fruit, fuelwood, lumber, and fodder trees.

The Study Sites

The study was conducted in two villages in Leyte (Eastern Visayas). San Isidro is located in the lowlands; San Miguel in the uplands (Figure 1).

San Isidro is a lowland *barangay* about 3.5 km from the municipal center of Baybay in the midwestern coast of the province of Leyte in Central Philippines. The area receives an annual rainfall of 2,058 mm, evenly distributed throughout the year. Average temperature is 27.1 degrees C. Its land area is approximately 3,500 hectares and its population totals about 1,400 people, consisting of 220 households distributed in four clusters or *sitios*. Farming is the common source of livelihood. The lower areas are generally planted to rice, while higher elevations are planted to coconut, bananas, root crops, and trees, including fruit trees.

An all-dirt road connects San Isidro to the national highway about 3 km away, which traverses Baybay and the city of Ormoc. Transportation generally does not pose a serious problem, as a number of motorcars and jeepneys regularly travel the *barangay*-town route. In Ormoc, there are several market outlets for farm produce. A few variety stores carry basic items for family needs.

San Isidro's public facilities are poor and limited to a chapel, health center, and basketball court, which also serves as venue for village dances and drying *palay*. Children attend primary school in an adjacent village; some pursue secondary training in Ormoc or at ViSCA. A few go on to college either in a private school in town, ViSCA, Tacloban City (capital city of Leyte), or Cebu City.

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[3]Rediscovering the Philippines Home Garden: Focus on the Multipurpose Tree Species, by E.R. Ponce, L.B. Ponce, and L.A. Maurillo. Paper presented at the Fourth Annual Meeting of the Philippine Multipurpose Tree Species Research Network, Tagaytay City, January 29-31, 1991.

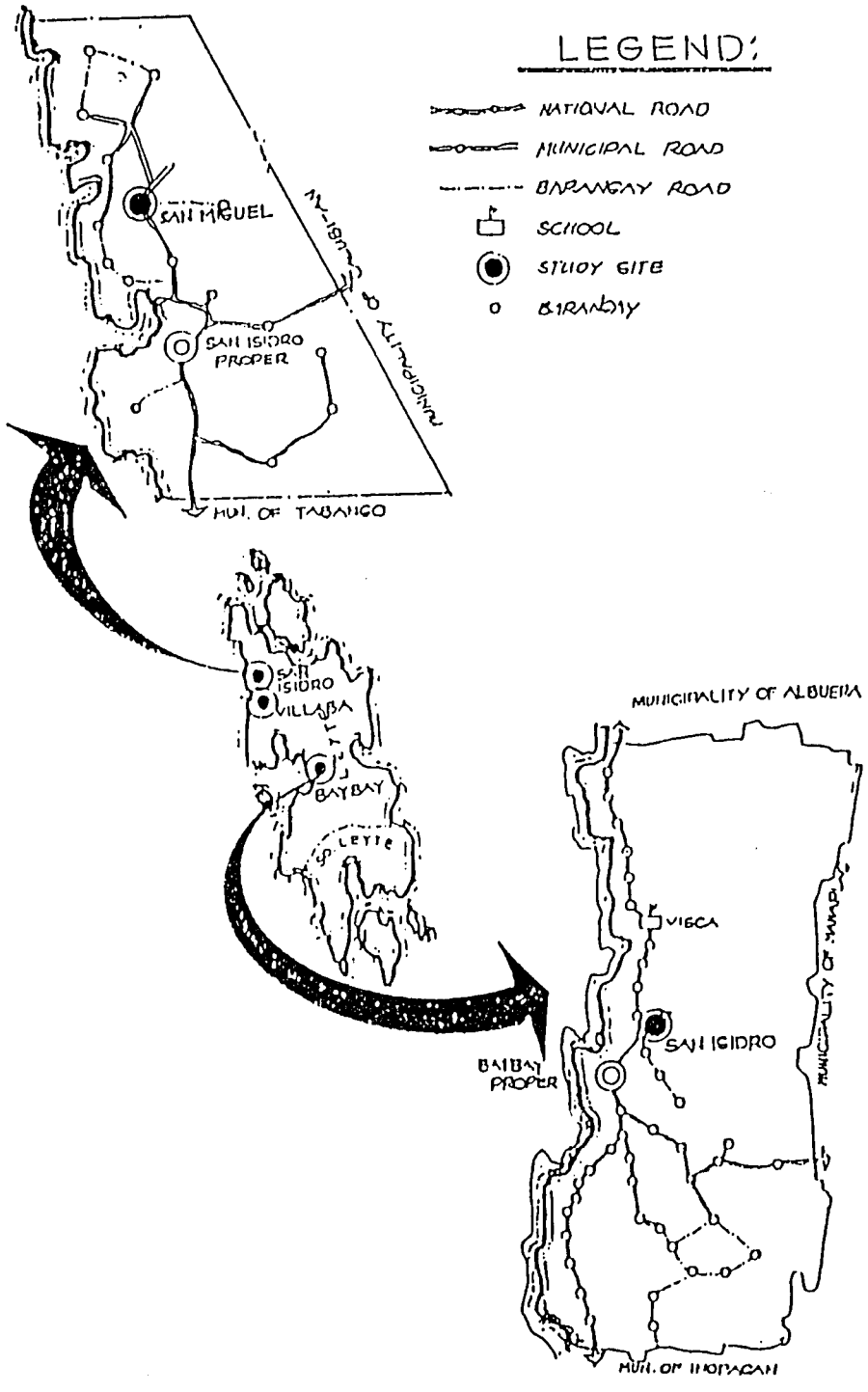

Figure 1. Map of Leyte, Philippines, showing the study villages.

San Miguel is a partially denuded upland *barangay* of San Isidro municipality in the northern part of Leyte. It is 5 kilometers away from San Isidro proper (not the lowland study village described above). The village is predominantly hilly land practically devoid of natural forest cover except for a few patches of shrubs and scattered trees, including *Leucaena leucocephala* (ipil-ipil) woodlots. The soil type belongs to the Medellin series that developed from calcareous materials. The surface soil is generally clay, very sticky when wet, and very vulnerable to erosion in dry periods or when heavy rains fall. Soil fertility is generally low despite development efforts of the past five years.

Maize is the dominant crop, usually planted with mungbean, root crops, bananas, a few coconut, some fruit trees, and leucaena. Fallowed areas are generally dominated by grasses, but some are planted to leucaena to help shorten the fallow period and supply farmers with fuelwood and fodder.

Transportation and water supply are serious problems in the area. The interior clusters of the two barangays are hardly accessible by vehicle especially during the rainy season. On the other hand, very few open-dug wells serve the water needs of the residents. Water from these wells is generally not safe for human consumption and is likely a major cause of epidemics during the rainy months. San Miguel also has 220 households, and a total population of about 733, distributed in four *sitios*.

Transportation and water supply are serious problems in San Miguel. The interior cluster are inaccessible by vehicle, especially during the rainy season. There are few open-dug wells to serve residents, and the water from them is generally not safe and is likely a major cause of epidemics during the rainy months.

Market outlets for farm products are located in town 5 km away. Public facilities are nearly non-existent except for a public primary school, *barangay* clinic, farmers' center, and chapel. Residential houses are small and mostly made of bamboo, round timbers, nipa, and cogon grass.

Results

Comparison of Preferred Food Species

Among the most popular fruit-tree species, *Artocarpus heterophyllus* (jackfruit) was most preferred by 40% of the lowland farmers; *Chrysuphyllum caimito* (caimito), *Psidium guajava* (guava), and *Mangifera indica* (mango) each were preferred by 20% of respondents (Table 1). Those who preferred *Artocarpus* cited its sweet aroma and varied uses (Table 2). Ripe fruits are eaten as dessert, while immature fruits are prepared in vegetable dishes, such as salads, or mixed with other vegetables, meat or fish, preferably with coconut milk. Mature seeds are boiled and eaten or prepared into snack items with sugar, coconut milk, and flavoring. The only undesirable characteristic reported for this species was that its raw seeds are scratchy (Table 3).

Table 1. Preferred tree species as source of food by lowland and upland farmers.

Priority	Species*	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
P1	*Artocarpus heterophyllus*	40	0	20
	Persea americana (avocado)	20	40	30
	Mangifera indica	20	20	20
	Chrysuphyllum cainito	0	20	10
	Psidium guajava	20	0	10
P2	*A. heterophyllus*	20	20	20
	Citrus maxima (pomelo)	20	20	20
	M. indica	20	0	10
	P. americana	20	0	10
	C. cainito	0	20	10
P3	*C. cainito*	20	20	20
	P. americana	20	0	10
	M. indica	0	20	10
	C. decumana	20	0	10
P4	*Syzygium acquaea* (tambia)	0	20	10

*P1 = Priority 1, P2= Priority 2, P3 = Priority 3, P4 = Priority 4

Table 2. Reasons for selection of species as best preferred food source.

Species	Reason	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
Persea americana	Fruit is nutritious, delicious and abundant	20	80	50
A. heterophyllus	Abundant and has multiple uses	20	0	10
M. indica	Sweet and aromatic	20	0	10
C. cainito *P. guajava*	Fruits are available and locally abundant	20	0	10

Table 3. Disliked characteristics of preferred fruit tree species by lowland and upland farmers.

Characteristics	Lowland (n=5)	Upland (n=5)	Total (n=10)
	PERCENTAGE		
Raw jackfruit seed is itchy	20	0	10
Avocado fruit is sometimes fibrous	20	0	10
Mango seldom bears fruits	20	0	10

Upland farmers, by contrast, preferred avocado as a food source over caimito and mango in the initial interview. They asserted that avocado fruit is high in nutrient content and delicious. It is also abundant in the area. According to the respondents, the fruit is highly digestible and is good for growing children. Some farmers noted, however, that they disliked certain avocado varieties with fibrous fruits.

This difference upland and lowland preferences for fruit trees is likely influenced by local availability of the preferred species. *Artocarpus* trees were more abundant in the lowland village than in the uplands. *A. heterophyllus* thrives well even in the shade under *Cocus nucifera* (coconut), a very common crop in the lowland. Similarly, upland farmers' preference for *Persea americana* was probably due to its abundance and absence of other fruit trees in the area. However, a few respondents preferred mango and caimito although they were aware that these species never bear fruits in their locality. Nonetheless, some *A. heterophyllus* grew in a village nearby San Miguel, and produced scanty, sweet-tasting fruits. Apparently, *A. heterophyllus* can thrive and produce in the area with proper management.

Preferred Characteristics of Fruit Tree Species

Separate interviews with respondents confirmed that everyone preferred different characteristics of MPTS. To select common characteristics for the various types of MPTS, the respondents were convened together. To ensure that the distinct views of both genders were considered, the women were interviewed as a group first, then their husbands; a third interview brought together both husbands and wives.

Canopy shape

The lowland housewives chose a fruit tree species with type C canopy shape (Figure 2, Table 4). Reasons for this were that a huge canopy is capable of bearing many fruits, abundant branches facilitate picking and harvest of fruits, and that a tall

trunk keeps fruits high enough to minimize theft of fruits. Upland housewives preferred type B for similar reasons (Table 5).

Like the upland women, husbands from both villages chose canopy type B for fruit trees. They preferred type B canopy because, with its numerous branches, it is capable of bearing many fruits. Moreover, they wanted a fruit tree with many leaves that can cover the fruits and reduce incidence of stealing.

Table 4. Comparison of preferred characteristics of fruit tree species among lowland wives and their husbands.

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		C	B	B
Stem form		D	B	B
Foliage	Shape	Serrate	Spatulate	Serrate
	Size	16 x 10.5 cm	19.5 x 7.5 cm	19.5 x 7.5 cm
Rooting habit		Big primary roots	Big primary and secondary roots	Big primary and secondary roots
Model tree species		*A. heterophyllus*	*C. caimito*	*A. heterophyllus*

Table 5. Comparison of preferred characteristics of fruit tree species among upland wives and their husbands.

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		B	B	B
Stem form		E	D	D
Foliage	Shape	Elliptical	Lanceolate	Elliptical
	Size	24 x 2.5 cm	15 x 5 cm	24 x 2.5 cm
Rooting habit		Big primary and secondary roots		
Model tree species		*Mangifera indica*	*M. indica*	*M. indica*

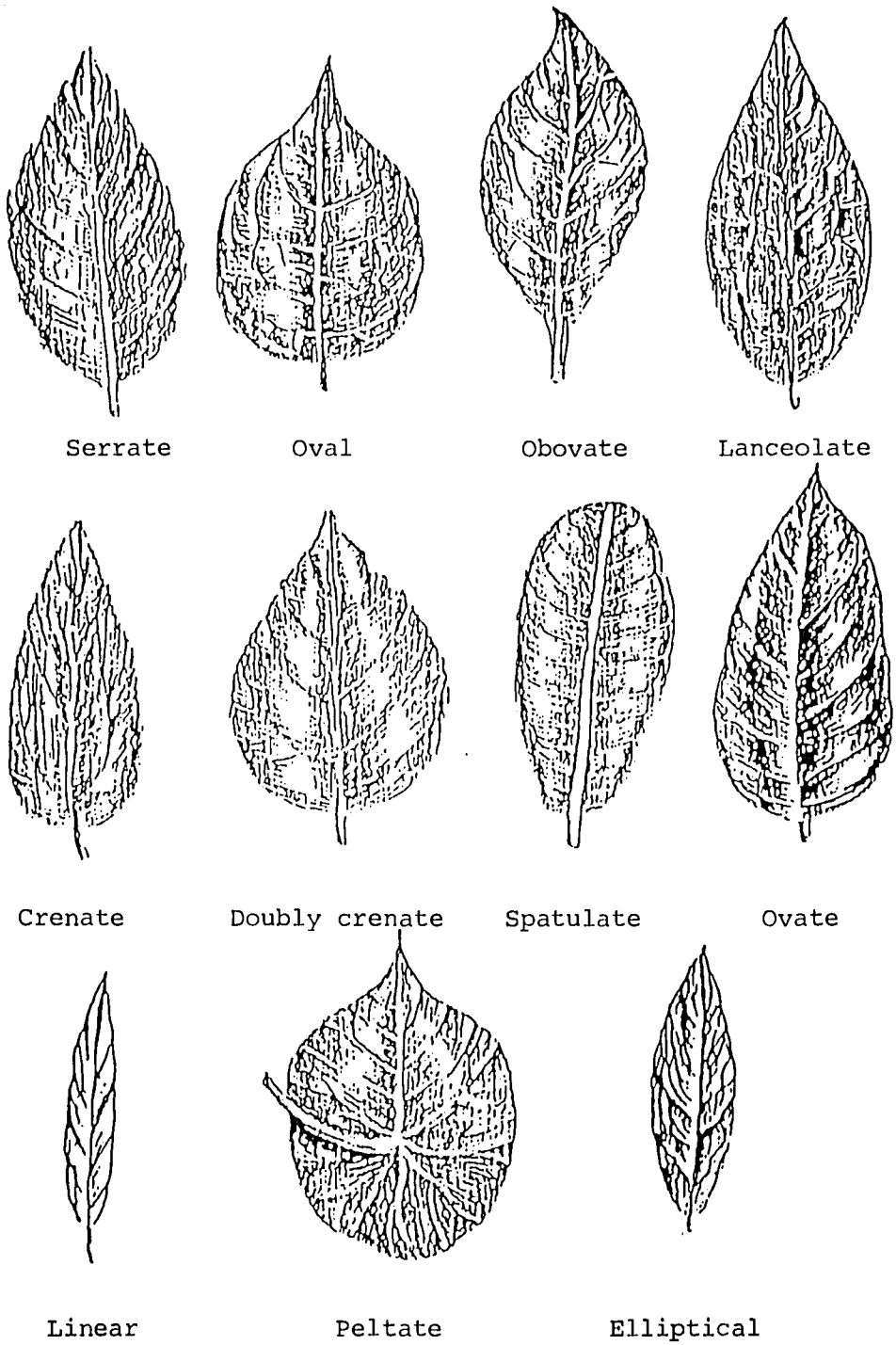

Figure 2. Line drawings used in interviews, with canopy shapes preferred by lowland and upland farmers.

When husbands and wives were convened together, couples from both villages preferred canopy Type B, stressing similar reasons. To typify their choice of canopy for a fruit tree species they selected *Mangifera indica*, because the illustration of Canopy Type B shown to them resembles a mango tree.

Stem form

The stem form chosen by the lowland women was Type D; those from the upland village chose Type E (Figure 3). The latter reasoned that Type E has plenty of big branches for bearing and holding plenty of fruits. Moreover, big branches with fruits are less likely to bend or break easily during typhoons. Lowland women, however, gave similar reasons for their choice of stem form Type D.

Husbands from the lowland village (San Isidro) chose Type B stem form for its many fruit-bearing branches. They also suggested that the stem should be durable and strong to support fruits even during typhoons. In contrast, upland husbands chose Type D stem form because it has big branches that can withstand typhoons, which are frequent and powerful in the area. Located at the peak of a denuded hill, the upland village is vulnerable to strong winds.

When husbands and wives met jointly to choose stem form, the husbands' choices in both villages dominated those of the wives. The lowland couples decided on stem form B, while those in the upland village chose Type D.

Foliage characteristics

Lowland men and women differed in their choice of foliage form when interviewed separately: women selected the serrate foliage measuring 16 x 10.5 cm, while their husbands chose the spatulate form measuring 19.5 x 7.5 cm. The upland wives chose elliptical shaped leaves measuring 24 x 2.5 cm, while their husbands preferred the lanceolate foliage form (15 x 5 cm). In both villages, when the men and women were brought together the wives' choices prevailed over that of their husbands.

Rooting habit

The lowland women wanted a fruit tree with big, deep primary roots so that it can stand strong winds. For similar reasons, upland wives also preferred big primary and secondary roots.

Husbands in each village showed the same preferences as their wives. They also preferred a species with big primary and secondary roots. Finally, the preferred fruit-tree rooting habit for the joint interview in both villages was similar to their individual choices.

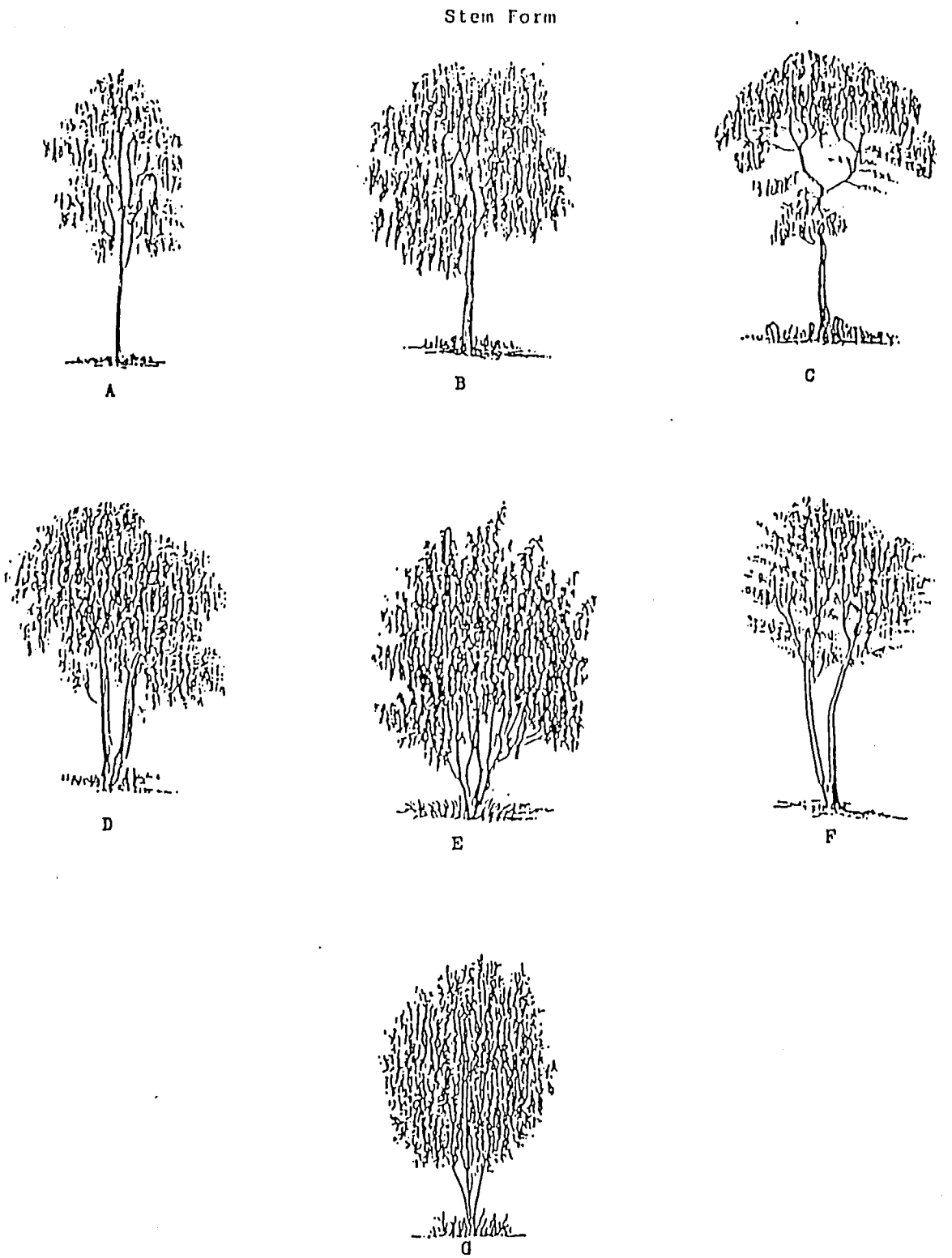

Figure 3. Drawings of stem forms from which respondents selected preferred types.

In the joint interview, lowland couples chose *Artocarpus heterophyllus*, which was the wives' choice during their interview, as their model fruit tree species. Upland couples, both in gender-separated and joint interviews, selected mango as their model fruit tree species.

Comparison of Preferred Fuelwood Species

Tree parts used by villagers for fuel include the woody branches and the trunk. From big trees, only the branches are used as fuelwood; for smaller species, both the trunk and branches are used.

Most respondents from both San Miguel and San Isidro preferred *Leucaena leucocephala* (ipil-ipil) for fuelwood (Table 6). Despite its scarcity in the lowlands and the prevalent use of coconut tree products for fuel, lowland farmers claimed that *L. leucocephala* wood kindles easily even when freshly cut, produces embers and charcoal, and leaves little ash (Table 7).

In addition to these characteristics, upland respondents said that *L. leucocephala* wood is easily split. Its small branches are cut and split for fuelwood even by women and young children. In the upland village, San Miguel, leucaena trees are commonly grown as hedgerows in contour farms and on scattered woodlots.

One farmer expressed disapproval at the idea of planting leucaena on the farm, saying that its shading effect on other farm crops would eventually destroy the latter.

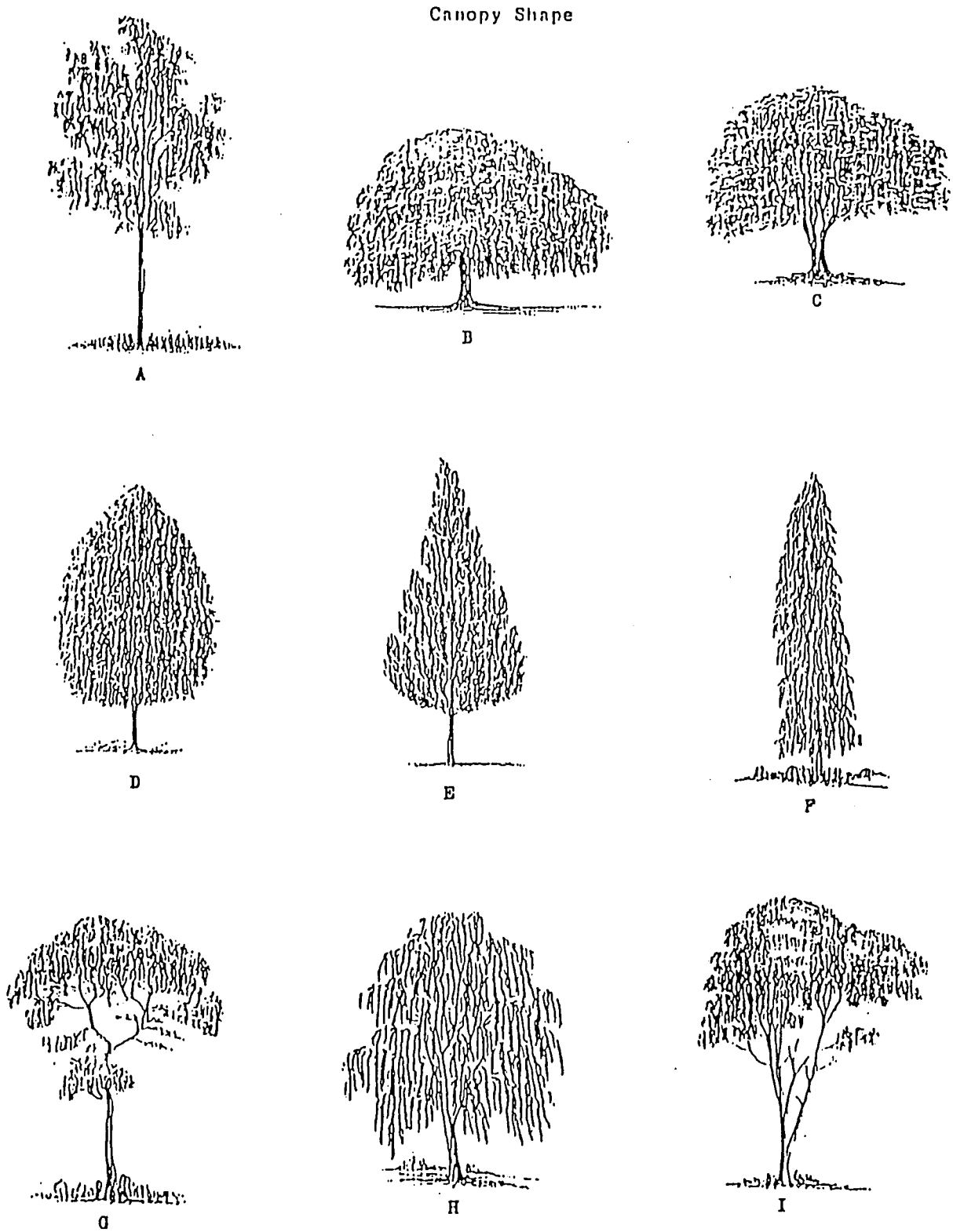

Figure 4. Drawings of leaf forms from which villagers chose preferences.

Table 6. Preferred fuelwood species.

Part/Priority*	Species	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
Branches:				
P1	*Leucaena leucocephala* (ipil-ipil)	20	100	60
	Chrysuphyllum caimito (caimito)	20	0	10
	Sandoricum koetjape (santol)	20	0	10
P2	*L. leucocephala*	20	0	10
	Vitex parviflora (molave)	0	20	10
	Pterocarpus indicus (narra)	20	0	10
P3	*P. indicus*	20	0	10
	L. leucocephala	20	0	10
Trunk:				
P1	*L. leucocephala*	40	100	70
	Cocus nucifera (coconut)	0	20	10
	Bambusa spp. (bamboo)	0	20	10
P2	*C. nucifera*	20	0	10
	Ficus nota (tibig)	0	20	10

*P1 = Priority 1, P2 = Priority 2, P3 = Priority 3

Table 7. Reasons given for selection of species as best source of fuelwood.

Reasons	Lowland (n=5)	Upland (n=5)	Total (n=10)
	PERCENTAGE		
L. leucocephala			
Kindles easily	100	60	80
Produces charcoal	40	60	50
Has little ash	20	0	10
Available in the area	0	20	10
S. koetjape			
Produces charcoal	20	60	50
Has sweet-smelling smoke	20	0	10
C. caimito			
Produces charcoal	40	60	50

Preferred Characteristics of Fuelwood Species

Canopy shape

The lowland women in the women's group survey preferred canopy Type C for fuelwood tree species because it has plenty of branches (Table 8). The upland wives preferred canopy Type B for similar reasons (Table 9). They added that a fuelwood tree species should be low enough to enable them to prune its branches easily.

Table 8. Preferred characteristics of fuelwood trees among groups in San Isidro (lowlands). husbands.

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		C	A	C
Stem form		D	B	B
Foliage	Shape	Linear	Serrate	Serrate
	Size	15 x 8 cm	10 x 4 cm	10 x 4 cm
Rooting habit			Big secondary roots	
Model tree species		*L. leucocephala*	*P. indicus*	*L. leucocephala*

Table 9. Preferred characteristics of fuelwood trees among groups in San Miguel (uplands).

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		B	C	B
Stem form		B	E	E
Foliage	Shape	Ovate	Serrate	Elliptical
	Size	1 x 0.5 cm	15 x 10 cm	15 x 5 cm
Rooting habit		Many big secondary roots	Big primary root	Big primary and many secondary roots
Model tree species		*L. leucocephala*	*L. leucocephala*	*L. leucocephala*

Lowland husbands chose canopy Type A for its long, straight trunk with stems positioned high up the tree. They reasoned that such type produces plenty of wood when split and has hardwood that can produce quality charcoal. By contrast, upland husbands selected canopy Type C, citing reasons similar to those given by lowland wives.

In the interview with both husbands and wives, the lowland couples preferred canopy Type C, while the uplanders chose Type B for similar reasons. They claimed that both types can produce much fuelwood because both have plenty of branches.

Stem form

During the final interview, lowland women chose stem-form Type D, while those from the uplands preferred Type B because they believed both types can produce plenty of fuelwood. Type D has plenty of small branches while Type B has few but big branches. The lowland husbands chose Type B, giving similar reasons as their wives gave for their choice. However, upland men chose Type E stem form because it has plenty of small branches that can be cut and split by women and young members of the household. The lowland husbands preferred a fuelwood species similar to *P. indicus* because it has hard wood that can produce quality heat and charcoal.

In the interview with both men and women, lowland and upland groups selected Types B and E, respectively. The men's choices overcame the women's preferences in the mixed-gender setting. The reason given for the joint decision on the stem form was that both types have numerous branches.

Foliage characteristics

For foliage, lowland women selected the linear shape, 15 x 8 cm, while those from the uplands chose the ovate foliage measuring 1 x 0.5 cm. The husbands from both villages selected the serrate leaf form, but differed in their preferred dimensions. The lowland husbands chose smaller foliage (10 x 4 cm) than that preferred by the upland men (about 15 x 10 cm).

In the interview with both men and women, the lowland group settled on the serrate leaf form with the same measurements as that identified by the husbands alone (10 x 4 cm). The upland couples, on the other hand, jointly selected the elliptical form measuring 15 x 5 cm, which was entirely different from the original choice of either the men or women.

Rooting habit

Women from both villages preferred big and numerous secondary roots. Similarly, the lowland husbands preferred a fuelwood tree species with big primary roots that can stand against strong typhoons. Upland men chose big secondary roots that can hold the soil against erosion.

In the final interview, both husbands and wives in the two villages settled for a choice very close to their original preferred rooting habit of fuelwood species. The lowland couples selected a species with big primary and numerous secondary roots; the

uplands group preferred one with big secondary roots to control soil erosion. The lowland wives, both separately and jointly with their husbands, chose *L. leucocephala* as their model fuelwood tree species; the lowland husbands in the men-only interview, however, identified *P. indicus* as their model tree. Upland couples in all interviews consistently selected *L. leucocephala* as their model tree for source of fuelwood.

Preferred Characteristics of Lumber Species

Lowland respondents selected *Shorea guisok* (guisok) as their preferred lumber species for its durability (Table 10). This species no longer grows in the area but still thrives in the nearby forestal zones. Due to its hard wood, the only disadvantage mentioned by farmers was the difficulty of driving nails into it (Table 11).

Table 10. Preferred lumber species.

Priority*	Species	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
P1	*Vitex parviflora*	0	100	50
	Shorea guisok	40	0	20
	P. indicus	20	0	10
	Artocarpus heterophyllus (jackfruit)	20	0	10
	Shorea spp. (lauan)	20	0	10
P2	*Euphoria didyma* (barayong)	20	0	10
	Antiaris blancoi (antipolo)	20	0	10
	Cocus nucifera	20	0	10
	S. guisok	0	20	10
	Shorea spp.	0	20	10
	L. leucocephala	0	20	10
	S. malibato (yakal)	0	20	10
P3	*Shorea spp.*	20	20	20
	S. guisok	20	0	10
	V. parviflora	20	0	10
	P. indicus	0	20	10
	Bambusa spp. (bamboo)	0	20	10
P4	*Combretodendron guadrialatum* (toog)	20	0	10

*P1 = Priority 1, P2 = Priority 2, P3= Priority 3, P4 = Priority 4

Table 11. Desirable and undesirable characteristics of lumber species.

Characteristic	Lowland (n=5)	Upland (n=5)	Total (n=10)
	PERCENTAGE		
Desirable:			
The grains of *P. indicus* and *A. heterophyllus* lumbers are attractive	40	0	20
V. parviflora and *S. guisok* woods are durable	60	100	80
Undesirable:			
A. heterophyllus wood has too many nodes	20	0	10
S. guisok and *V. parviflora* lumbers are hard to drive nails into	20	20	20

Among the upland respondents, *Vitex parviflora* (molave) was highly preferred for lumber for the same reason: durability. It is the only lumber species locally available because farmers took good care of them. It is also very likely that this species was well adapted to the environmental conditions of the area, guaranteeing its survival even under adverse conditions while other lumber species became scarce.

Species that farmers ranked as second, third, and fourth priorities were *Euphoria didyma*, *Antiaris blancoi*, *C. nucifera*, *L. leucocephala*, *Shorea malibato*, *Bambusa spp.*, and *Combretodendron guadrialatum* (Table 10). The majority, however, did not prefer these because they are vulnerable to weevil attacks, not durable, and rot easily when buried in the ground as posts (Table 12). Despite its durability, *S. malibato* was not a first preference because it is scarce in both areas.

Table 12. Reasons for not preferring certain tree species as sources of fruit, fuelwood, and lumber.

Type of Product/Reasons	Lowland (n=5)	Upland (n=5)	Total (n=10)
	PERCENTAGE		
Fruits:			
Not available in the place	40	0	20
Fruit is not of good eating quality	20	20	20
Fruit is sour	20	20	20
Fruit is too watery and juicy	0	20	10
Fuelwood:			
Too many ashes	40	0	20
Makes much smoke	60	0	30
No embers	20	0	10
Lumber:			
Easily attacked by weevils	60	20	40
Not durable	20	20	20
Scarce	0	20	10
Easily rots when buried in the ground	0	20	10

Preferred Characteristics of Lumber Species

Canopy shape

During the final interview, both lowland and upland wives and their husbands preferred canopy Type A for lumber trees because it has a long, straight bole (Tables 13 and 14). The branches are positioned high up the tree, making the trunk free of unsightly nodes when sawn into lumber.

Table 13. Preferred characteristics of lumber trees in San Miguel (uplands).

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		A	A	A
Stem form		G	B	B
Foliage	Shape	Doubly crenate	Obovate	Obovate
	Size	10 x 16 cm	5 x 10 cm	5 x 10 cm
Rooting habit		Big primary and secondary roots		
Model tree species		*Shorea spp.* (luaun)	*S. guisok* (guisok)	*S. guisok*

Table 14. Preferred characteristics of lumber tree species in San Isidro (lowlands).

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		A	A	A
Stem form		D	A	D
Foliage	Shape	Oval	Crenate	Elliptical
	Size	13 x 10 cm	10 x 20 cm	15 x 4 cm
Rooting habit		Big primary and secondary roots		
Model tree species		*Vitex parviflora*	*V. parviflora*	*V. parviflora*

Stem form

Lowland wives preferred stem form Type G for lumber species because it has plenty of big and straight branches that can either be sawn into lumber or used as post for makeshift huts, animal pens, or fences. By contrast, upland wives preferred type D stem form but offered similar reasons for their preference.

Lowland husbands preferred stem form Type B because the branches are positioned high up the trunk, maximizing the trunk's utility. Upland husbands, however

preferred Type A for its numerous branches that can be used as posts and other construction materials. In the final interview with both men and women, lowland couples jointly preferred Type B, while their upland counterparts chose Type D for the same reasons given earlier.

Foliage characteristics

For lumber species, lowland women preferred doubly crenate leaves measuring 10 x 16 cm; upland women selected the oval form with a dimension of 13 x 10 cm. Lowland husbands preferred obovate foliage (5 x 10 cm), while upland men chose larger (10 x 20 cm), crenate leaves. When the couples were interviewed together, the lowland group decided on the preference expressed by the men-only group. Uplanders selected elliptical leaves measuring 15 x 4 cm, which was the choice of neither gender group in the separate interviews.

Rooting habit

Both the lowland and upland wives preferred a lumber tree with big primary and secondary roots, claiming that such a rooting system would make the tree strong against the typhoons that frequently hit the area.

The lowland wives and their husbands in separate interviews selected *Shorea spp.* (lauan) and *S. guisok* (guisok), respectively, as model lumber species. In the joint interview, the husbands' choice prevailed over that of the women. The upland couples, on the other hand, consistently selected in all interviews *V. parviflora* as their model lumber species.

Preferred Fodder Species

Leucaena leucocephala was the only tree species preferred as a fodder source by the farmers from both villages (Table 15). Despite its scarcity in the lowland village, the respondents preferred the species because it is the only fodder tree that animals really liked to eat. They related an earlier misconception that only ruminants eat leucaena fodder, adding the observation that pigs relished it as much as ruminants.

In the uplands, leucaena was highly preferred as fodder because it is abundant in the area. The farmers grow leucaena trees along the contours of their farms, on field margins, and in other areas with barren soil as organic fertilizer. Some farmers dried the leaves and sold them for quick cash to local businessmen, who in turn sold it to feed mills in the neighboring province.

As mentioned earlier, one farmer remained skeptical of growing leucaena near farm crops, saying that its shade exerts a negative effect on the other crops.

Table 15. Preferred fodder tree species and reasons for selection.

Species/Reasons	Lowland (n=5)	Upland (n=5)	Total (n=10)
	PERCENTAGE		
Species:			
L. leucocephala (Ipil-ipil)	40	100	70
Reasons:			
Abundant in the area	0	60	30
Pigs find it palatable	20	0	10

Comparison of Preferred Characteristics of Fodder Tree Species

Canopy shape

Lowland wives preferred canopy Type H for fodder trees (Table 16), saying that it resembles *L. leucocephala.* Upland wives, on the other hand, selected canopy Type B because it is huge and capable of producing much fodder (Table 17). They also said they preferred the tree to be low enough to facilitate harvesting of fodder. The husbands in both villages also preferred canopy Type B, with reasons similar to those of their wives. The husbands' choice dominated in the joint interview.

Stem form

Both husbands and wives in both villages consistently preferred stem form E for a fodder tree, asserting that it resembles *L. leucocephala*, their model tree.

Table 16. Characteristics of fodder tree species preferred by groups in San Isidro (lowlands).

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		H	B	B
Stem form		E	E	E
Foliage	Shape	Ovate	Peltate	Ovate
	Size	1 x 0.5 cm	60 x 37 cm	1 x 0.5 cm
Rooting habit		Big primary and secondary roots		
Model tree species		*L. leucocephala*	*Artocarpus integrifolia* (breadfruit)	*L. leucocephala*

Table 17. Characteristics of fodder trees preferred in San Miguel (uplands).

Characteristics		PREFERENCE Wives	Husbands	Both Husbands and Wives
Canopy		B	B	B
Stem form		E	E	E
Foliage	Shape	Ovate	Ovate	Ovate
	Size	1 x 0.5 cm	1 x 0.5 cm	1 x 0.5 cm
Rooting habit		Big primary and numerous secondary roots		
Model tree species		*L. leucocephala*	*L. leucocephala*	*L. leucocephala*

Foliage characteristics

For a fodder tree, both lowland and upland wives chose ovate foliage measuring 1 x 0.5 cm. They claimed that small leaves are highly digestible even by small and monogastric animals. The upland husbands also chose the shape and size of *L. leucocephala* leaves. In contrast, lowland husbands preferred the peltate shape with a size of 60 x 37 cm. They reasoned that broader foliage enables the ruminants to become full easily. In the joint interview however, couples from both villages decided for ovate foliage, with *L. leucocephala* as their model tree.

Rooting habit

Since both the lowland and upland couples had observed that *L. leucocephala* trees are uprooted easily, they suggested that a fodder tree should have big primary and secondary roots. Such rooting habit, they said, not only can stand against typhoons but also can effectively control erosion.

Comparison of Lowland and Upland Ideotypes

Based on the characteristics preferred by the respondents from both villages for different tree types, ideotypes were defined. Although the tree ideotypes preferred by lowland and upland farmers for different products have several common characteristics, certain features distinguish the San Isidro (lowland) ideotypes from those of San Miguel (upland).

Lowland fruit tree ideotype

The lowland ideotype of a fruit tree species resembles *Artocarpus heterophyllus* (Figure 5). Fully grown, its trunk is straight and large and can yield abundant fruits and hardwood lumber. It has a big, strong primary root that penetrates deep into the ground, and large secondary or lateral roots, some of which are exposed, that can resist strong winds. Exposed secondary roots can be used for tool handles and small farm implements. Its many large, strong branches form a huge canopy capable of bearing many big fruits. Its leaves are serrate, the size of *Chrysuphyllum caimito* leaves, succulent, and have tasty flavor that can be given as fodder for ruminants and smaller animals. The fruit are resistant to rot and the fleshy edible portions are thick, firm, and sweet. It is shade tolerant, fixes nitrogen and thus adapts to adverse soil conditions, tolerant of both extreme dry and wet seasons, and resistant to diseases and insect pests.

Upland fruit tree ideotype

The upland ideotype of a fruit tree species resembles *Mangifera indica* (Figure 6). Its canopy is big to provide shade for people and animals, and its many strong branches are capable of bearing many fruits. Like the lowland ideotype, it has: a large, tall, straight trunk that provides good lumber if allowed to mature; a strong, deep primary root that supports the trunk against typhoons; and large exposed lateral roots that can be used as tool handles. Unlike the lowland ideotype, its leaves are elliptical (15 x 5 cm), but like the lowland ideotype they are succulent, palatable fodder. It fixes nitrogen, tolerates drought, minimizes erosion, and is resistant to pests and diseases.

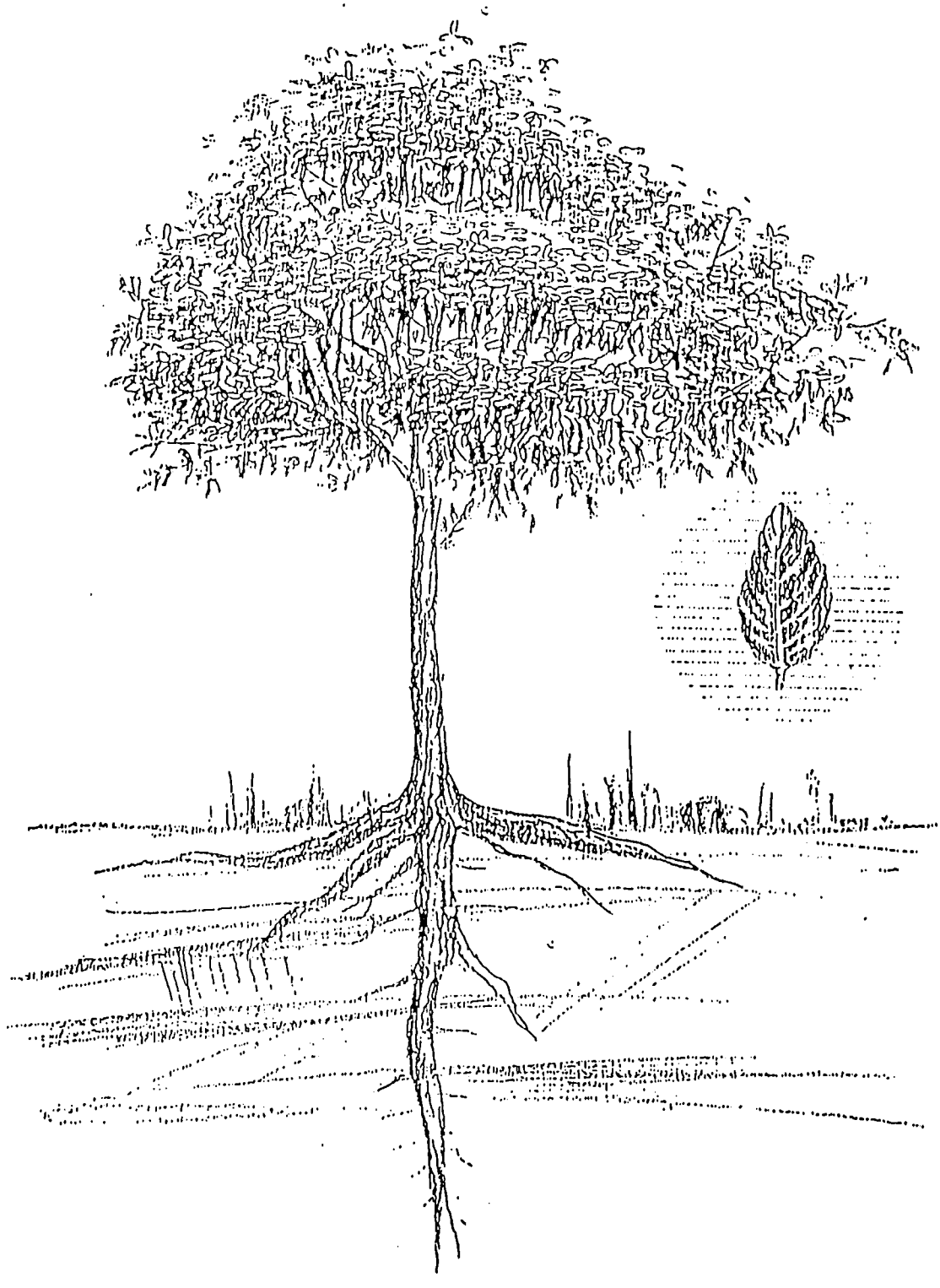

Figure 5. Ideotype of lowland fruit tree.

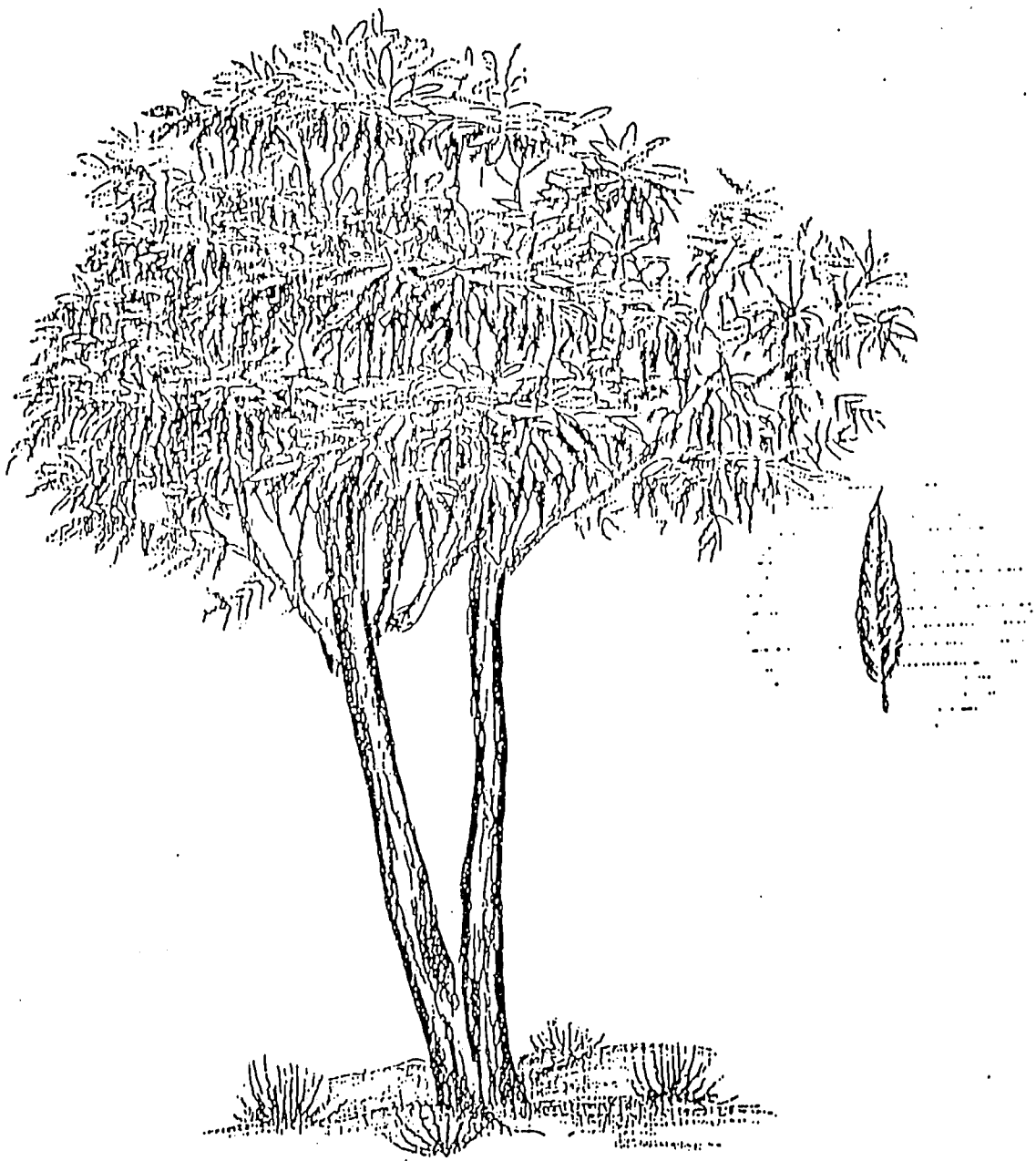

Figure 6. Ideotype of upland fruit tree.

Lowland fuelwood tree ideotype

The lowland ideotype of a fuelwood tree resembles *L. leucocephala* (Figure 7). It has a big canopy to provide shade, and its many big branches produce much fuelwood when split. It has hardwood that produces good quality heat and charcoal. The secondary or lateral roots are big to support the tree against strong winds. Exposed lateral roots can also be used as fuelwood. The leaves are elliptical and measure 15 x 5 cm.

Upland fuelwood tree ideotype

The upland ideotype of a fuelwood tree also resembles *L. leucocephala*, but with some differences from the lowland ideotype (Figure 8). Its canopy is Type B, resembling *Mangifera indica*, while its stem form is Type E with many small branches for fuelwood. Small branches can be split even by women and young members of the household. Its leaf form is serrate, measuring 10 x 4 cm, and its root system has big primary and numerous secondary roots to make the tree strong and to help protect the soil from erosion.

Lowland lumber tree ideotype

For lowland farmers, the preferred lumber tree is *Shorea guisok* (guisok), with a big, tall, straight trunk and many large branches positioned high up the tree (Figure 9). Its strong, durable hardwood has a reddish grain color. The leaf form is obovate, 10 x 5 cm in size. It has big primary and secondary roots for support against strong winds.

Upland lumber tree ideotype

The upland lumber ideotype resembles *Vitex parviflora* (Figure 10) with the same form as the lowland ideotype: large, tall trunk with big branches high up the tree. It also has strong primary and secondary roots as support against strong winds and erosion. Like the lowland ideotype it has strong and durable hardwood but with yellowish grain rather than reddish. Its leaves are elliptical measuring 15 x 4 cm. In addition, it can tolerate infertile, dry soils and it resists pests and diseases.

Lowland and upland fodder tree ideotype

As shown in Figure 11, the ideotype of a fodder tree for both villages is *L. leucocephala*, with the following modifications: the canopy shape is huge (Type B) and the stem has many small branches that can produce plenty of fodder (Type E). The foliage is ovate and measures 1.0 x 0.5 cm, similar to that of *Leucaena*. Like the other ideotypes, its strong primary and secondary roots support the tree against strong winds and help control soil erosion.

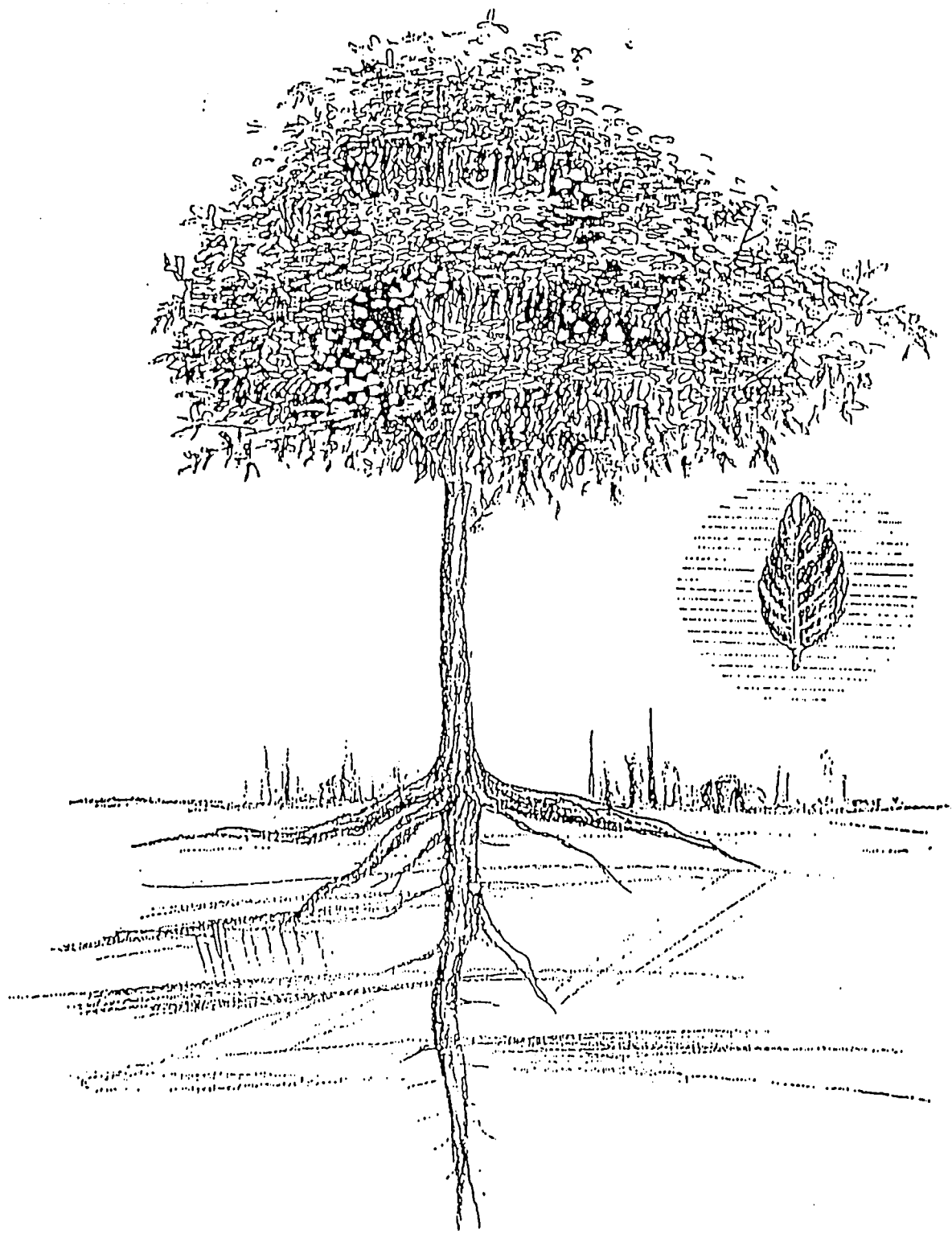

Figure 7. Ideotype of lowland fuelwood tree.

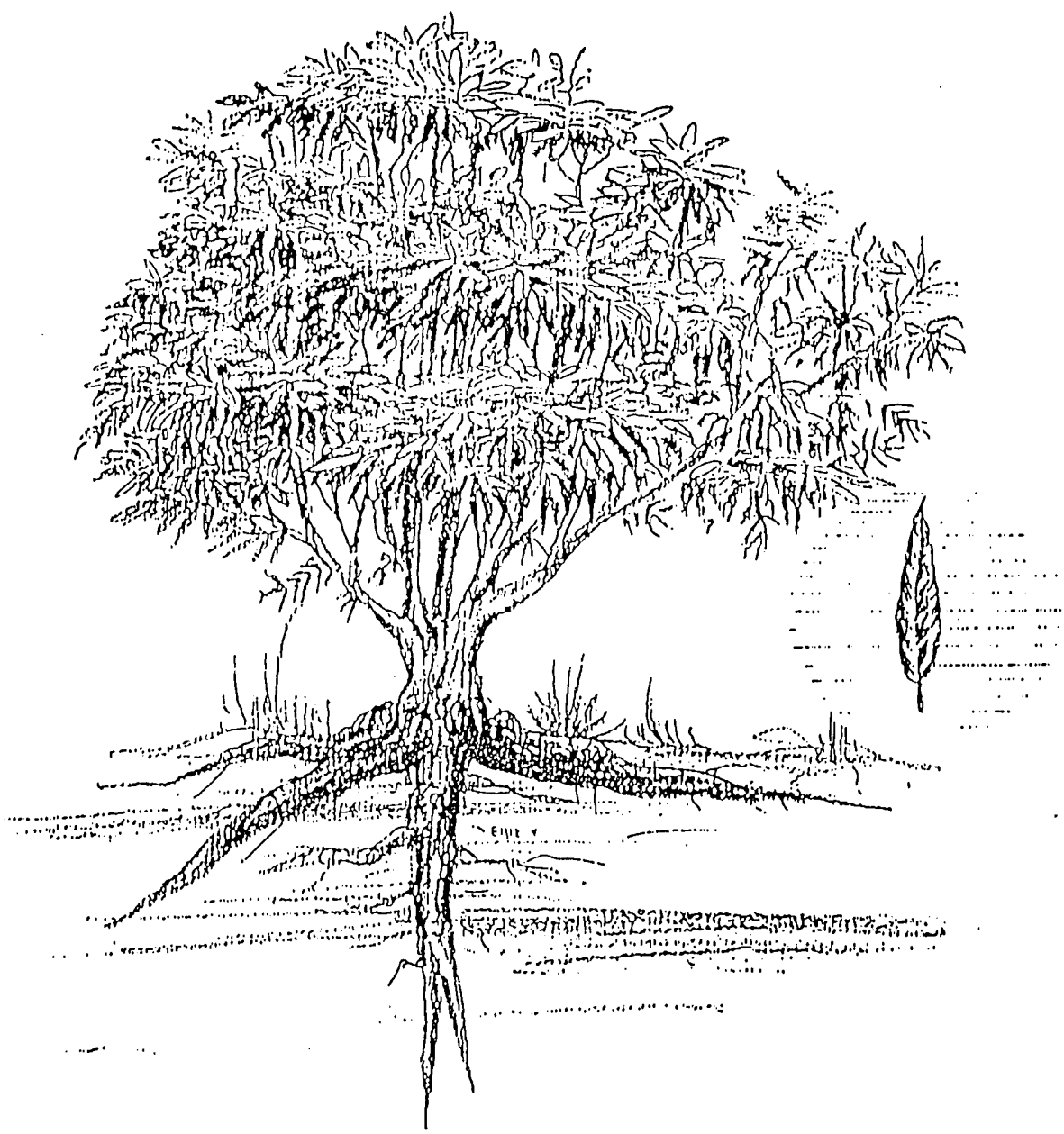

Figure 8. Ideotype of upland fuelwood tree.

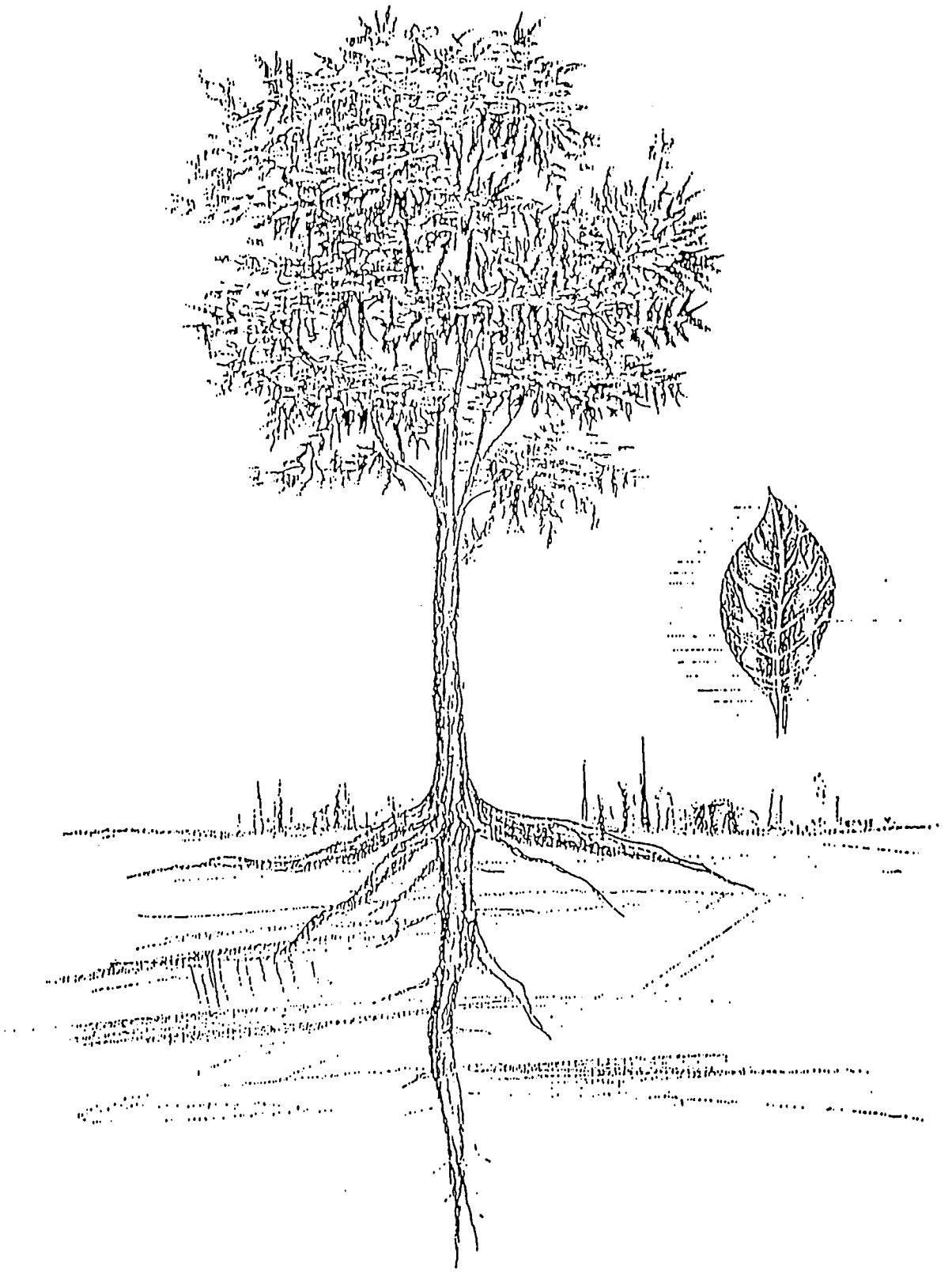

Figure 9. Ideotype of lowland lumber tree.

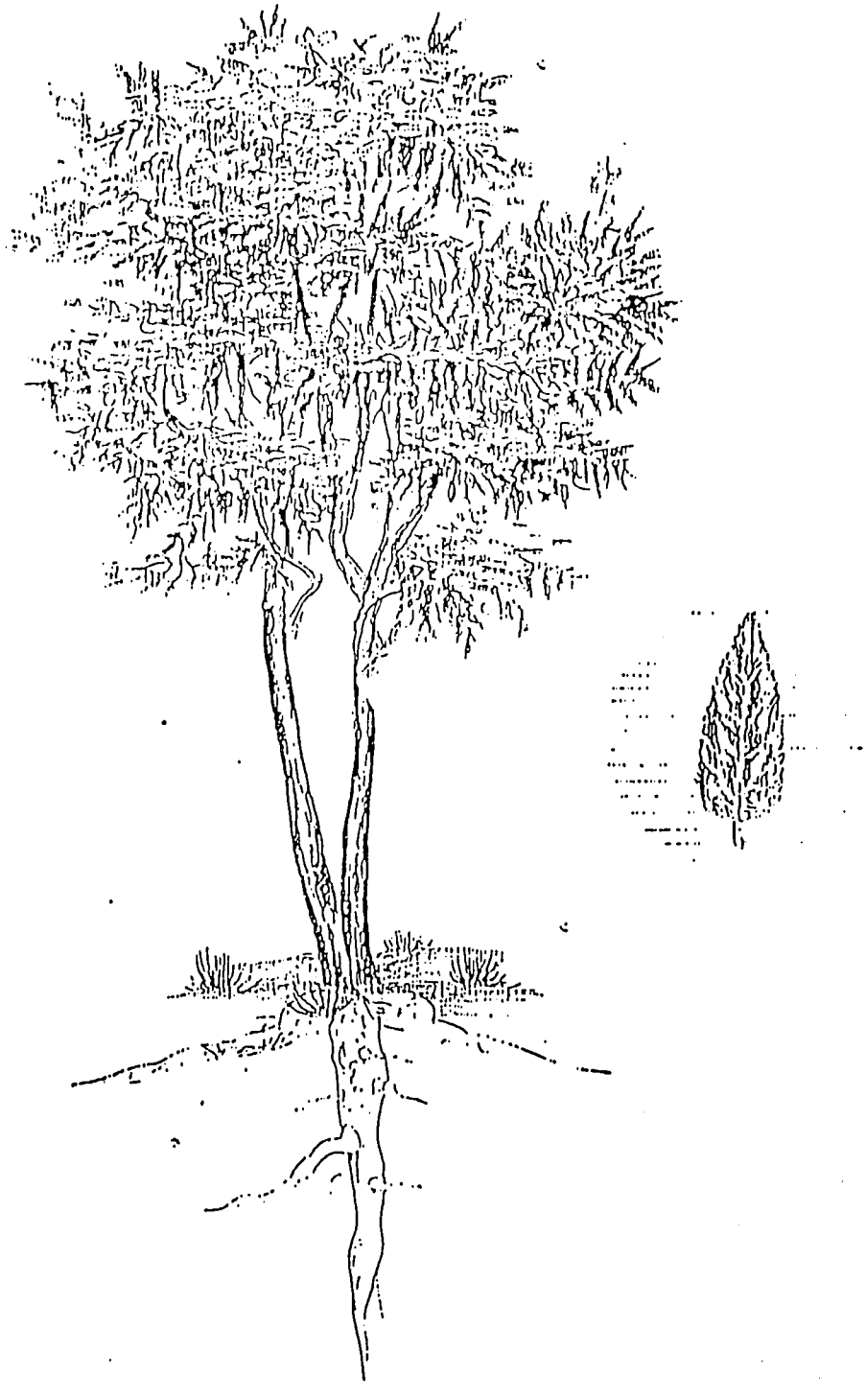

Figure 10. Ideotype of upland lumber tree.

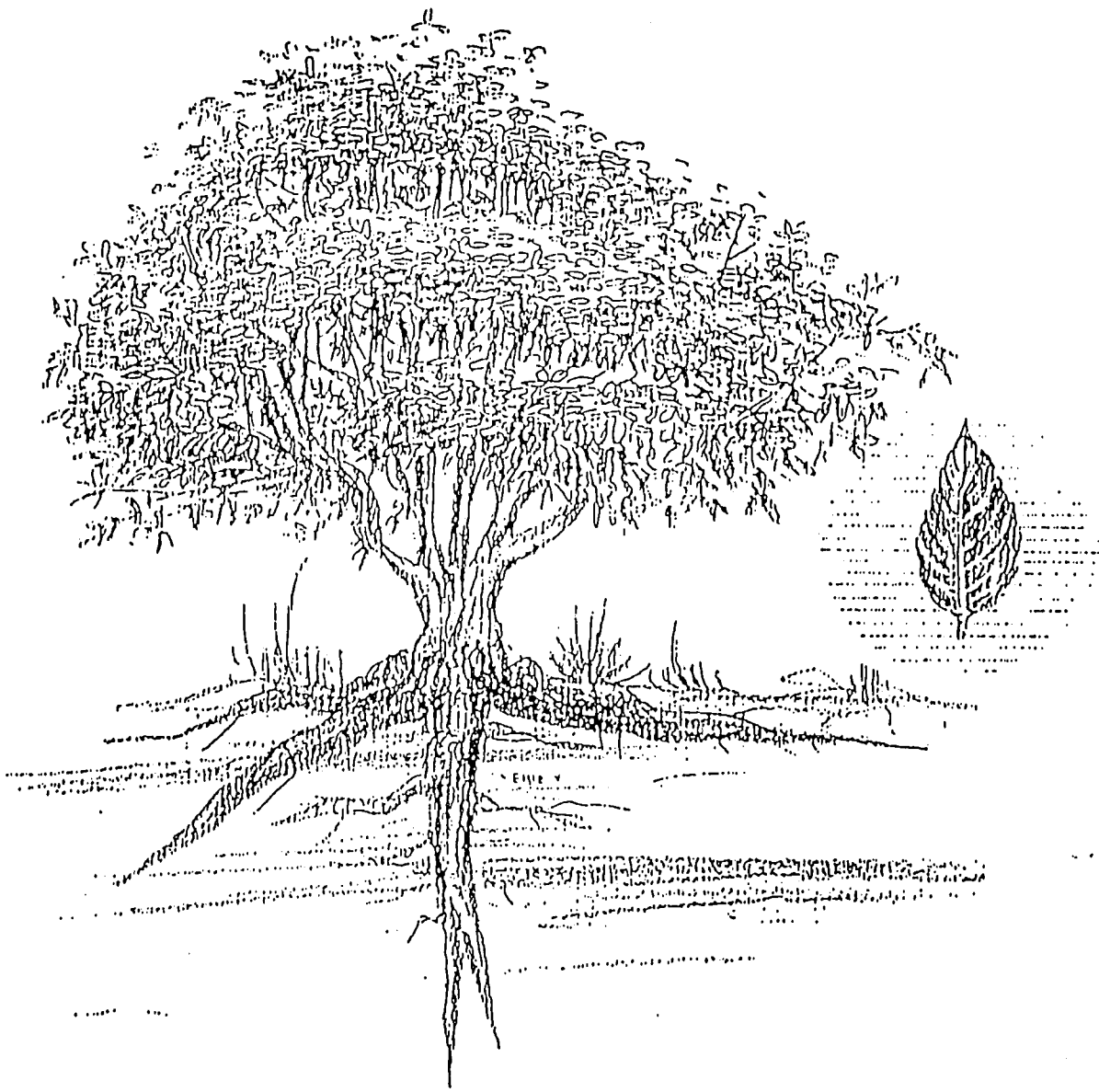

Figure 11. Ideotype of lowland and upland fodder tree.

Planting Niches of Preferred Tree Species for Different Uses

All respondents from both villages preferred to plant their preferred fruit tree species in the home gardens or around the house so that they could harvest the fruits any time (Table 18). They also reasoned that proximity of the fruit tree to the house minimizes the theft of fruits, which was reported as a major problem in both areas. Fruit trees near the home also serve as windbreaks and provide shade for people and animals.

Farmers chose to plant small trees with woody branches that could yield fuelwood either in the home gardens or in field margins. They preferred to plant large fuelwood tree species in the farm and field margins to minimize overcrowding of fruit trees and other plants in the home garden.

In general, respondents chose to plant lumber trees in field margins to minimize the shading effect on other crops in the farm. Only a few said they preferred to plant lumber species in the home gardens, because they grow to enormous sizes which crowd and destroy other plants. One farmer, however, would plant it in the farm if the tree is small enough and does not produce much shade.

Table 18. Planting niches for preferred trees, by product.

Product	Niches	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
Fruit	Home garden	100	60	80
Fuelwood				
Branches	Home garden	60	0	30
	Field margin	0	60	30
Trunk	Field margin	60	0	30
	Farm	0	60	30
Lumber	Field margin	80	80	80
	Home garden	40	0	20
	Farm	0	20	10
Fodder	Farm	0	40	20

With regard to fodder trees, the respondents preferred to plant them as hedge rows in their contour farms. Others preferred to plant them in areas away from their farm to provide a continuous supply of fodder and fuel.

Sources of Planting Materials

Farmers obtained planting materials of preferred fruit tree species from their relatives. Some reported they collected seedlings from existing trees in their locality. A few others said they purchased the materials or requested them from neighbors.

The chief sources of seedlings of fuelwood species, such as *L. leucocephala*, were ViSCA technicians who worked previously in the two areas (Table 19). Some farmers also reported they purchased planting materials in town or acquired them from their parents or others in the *barangay*.

Those who planted lumber trees said they grew seedlings collected from the forest, probably from seeds blown on the wind or carried by birds and insects. One farmer claimed he got his seedling from his own village. Others did not have sources of seedlings so they could not plant lumber species despite their interest to grow them.

Table 19. Sources of planting materials of preferred species, by tree product.

Product	Source of Planting Material	Lowland (n=5)	Upland (n=5)	Total (n=10)
		PERCENTAGE		
Fruit				
	Relatives within the village	40	0	20
	Relatives in the municipality	40	0	20
	Old plants	20	0	10
	Purchased	0	20	10
	Neighbors	0	20	10
Fuelwood (trunk, branches)				
	ViSCA	60	60	60
	Purchased in town	40	0	20
	Parents	20	0	10
	Within the village	20	0	10
Lumber				
	Grew wild	20	60	40
	Within the village	20	0	10